VARIAN

vacuum technologies

TITANIUM SUBLIMATION CARTRIDGE

916-0050 series

(GB) INSTRUCTION MANUAL

87-900-097-01(C)
APRIL 2006

Titanium Sublimation Cartridge

VARIAN

vacuum technologies

Dear Customer,

Thank you for purchasing a VARIAN vacuum product. At VARIAN Vacuum Technologies we make every effort to ensure that you will be satisfied with the product and/or service you have purchased.

As part of our Continuous Improvement effort, we ask that you report to us any problem you may have had with the purchase or operation of our product. On the back side you find a Corrective Action Request form that you may fill out in the first part and return to us.

This form is intended to supplement normal lines of communications and to resolve problems that existing systems are not addressing in an adequate or timely manner.

Upon receipt of your Corrective Action Request we will determine the Root Cause of the problem and take the necessary actions to eliminate it. You will be contacted by one of our employees who will review the problem with you and update you, with the second part of the same form, on our actions.

Your business is very important to us. Please, take the time and let us know how we can improve.

Sincerely.

Sergio PIRAS

Vice President and General Manager
VARIAN Vacuum Technologies

Note: Fax or mail the Customer Request for Action (see backside page) to VARIAN Vacuum Technologies (Torino) - Quality Assurance or to your nearest VARIAN representative for onward transmission to the same address.

CUSTOMER REQUEST FOR CORRECTIVE / PREVENTIVE / IMPROVEMENT ACTION

TO : VARIAN VACUUM TECHNOLOGIES TORINO - QUALITY ASSURANCE

FAX N° : XXXX - 011 - 9979350

ADDRESS: VARIAN S.p.A. - Via F.lli Varian, 54 - 10040 Leinì (Torino) - Italy

E-MAIL : marco.marzio@varianinc.com

NAME	COMPANY	FUNCTION

ADDRESS :

TEL. N° : FAX N° :

E-MAIL :

PROBLEM / SUGGESTION :

REFERENCE INFORMATION (model n°, serial n°, ordering information, time to failure after installation, etc.) :

DATE

CORRECTIVE ACTION PLAN / ACTUATION (by VARIAN VTT) LOG N°

XXXX = Code for dialing Italy from your country (es. 01139 from USA; 00139 from Japan, etc.)

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SAFETY SUMMARY

This instruction manual includes information required to enable qualified personnel to safely and reliably perform those functions for which the product was designed.
Should the product fail to operate, the operator must call upon qualified maintenance personnel to troubleshoot and repair.
Throughout this manual you will find the words: WARNING CAUTION NOTE which have the following meaning

⚠ WARNING!

Warnings are used when failure to observe instructions or precautions could result in injury or death to humans.

☞ CAUTION

Cautions are used when failure to observe instructions could result in permanent damage to equipment (Varian supplied and/or other associated equipment).

NOTE

Information to add you in obtaining the best performance from your instrument.

SAFETY PRECAUTIONS

⚠ WARNING!

Before connection of the cable from the controller, the Titanium Sublimation Cartridge must be inserted into the vacuum system.

DESCRIPTION

General

The titanium sublimation cartridge model 916-0050 (fig. 1) provides a titanium source for titanium sublimation pumping in both high vacuum and baked ultra high vacuum systems.
The cartridge holds three filaments and offers an economical means of pumping chemically active (getterable) gases at high speeds.
The titanium sublimation cartridge can be used with other pumps which remove non-getterable gases.

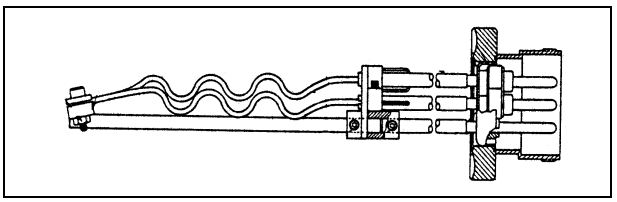

Figure 1 - Titanium Sublimation Cartridge

The filaments are made of a titanium-molybdenum alloy and are constructed to prevent burnout. They are held in place by gold plated set screws which allow easy filament removal and replacement.
The titanium sublimation cartridge mates with any 2 ¾" O.D. (NW35) ConFlat® flange.

Product Specification

Part number:	916-0050
Description:	TSP Filament Cartridge on 2 ¾ CFF
Short description:	TSP Cartridge 2 ¾ CFF

Filament specification

Material:	85Ti-15Mo
Length:	152.4 mm
Diam:	1.99 mm
Total Titanium:	2.7 gr
Dispensable Titanium:	1.1 gr
Maximum operating current:	50 A
Maximum power:	225 Watts
Operating voltage:	4.5 V at holder
Life:	12 hr at 50 A
Sublimation rate:	0.09 to 0.1 gr/hr

Weight:	0.6 kg

Part number:	916-0051
Description:	TSP Filament, pkg of 12
Short description:	TSP Filament, pkg of 12

Filament specification

Material:	85Ti-15Mo
Length:	152.4 mm
Diam:	1.99 mm
Total Titanium:	2.7 gr
Dispensable Titanium:	1.1 gr
Maximum operating current:	50 A
Maximum power:	225 Watts
Operating voltage:	4.5 V at holder
Life:	12 hr at 50 A
Sublimation rate:	0.09 to 0.1 gr/hr

Holder

Vacuum flange	2 ¾" O.D. (NW35) ConFlat
Bakeability	250 °C for normal operation 450 °C with reduced life caused by oxidation of brazed joints and increased thermal shock.

Outline Drawing

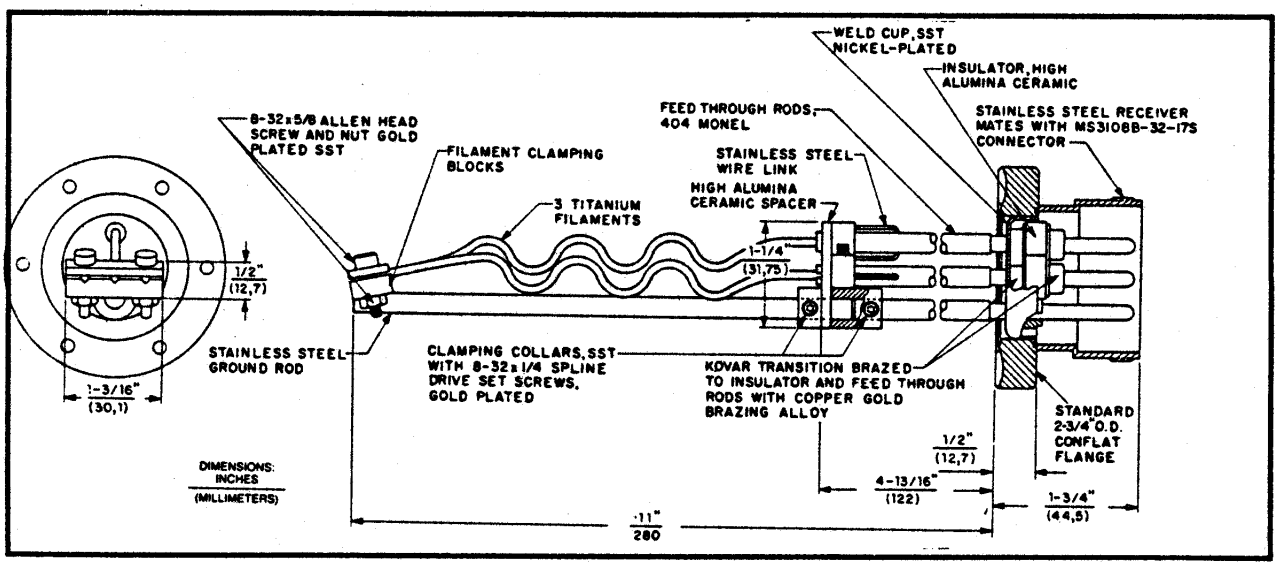

Figure 2 - Outline Drawing of Titanium Sublimation Cartridge

INSTALLATION

Vacuum Connection

Insert the cartridge in a vacuum chamber and secure it in place by the ConFlat flange with a new copper gasket between the two flanges.
To prevent galling apply high temperature lubricant (such as Fel-PRO C-100) to screw threads and between nuts and flange. Uniformly tighten screw and nut set until the flange faces meet.

Control Unit Connection

Connect the output cable of the control unit to the filament cartridge. Consult the control unit instruction manual for detailed information.

OPERATING INSTRUCTIONS

General

For a detailed explanation of the sequential use and operation please refer to the instruction manual of the control unit used.
The theory of titanium sublimation pumping is also covered in each control unit instruction manual.

Filament Outgassing

Rough pump the system to a pressure below 10^{-2} Torr/mbar range and outgas each new filament in turn at a current of 37 to 42 A for at least 1 minute.
This outgassing procedure will reduce the burst of gas released from a new filament when power is applied for pumping at low pressure.
To achieve maximum net pumping at ultra high vacuum, degas filament at 30 ÷ 35 A during the entire ultra high vacuum system bakeout period.

Normal Operation

Adjust the current level to the desired setting and in accordance with the titanium sublimation rate (see fig. 3).
The amount of current determines the temperature of the filament and in turn the rate at which titanium is sublimed. For normal TSP-filament operation, the current should be maintained at the desired current level throughout the life of the filament. A desirable current level would be 46 to 48 A.

End of Filament Life

Filaments do not necessarily burn out at end of life. Therefore, other means may be used to determine when the usable titanium has been consumed.
End of filament life can be recognised when:

- Desired current cannot be maintained even at maximum voltage/current setting.
- There is no improvement in pressure after power has been applied to a filament.
- Change in resistance – open circuit (no current reading).

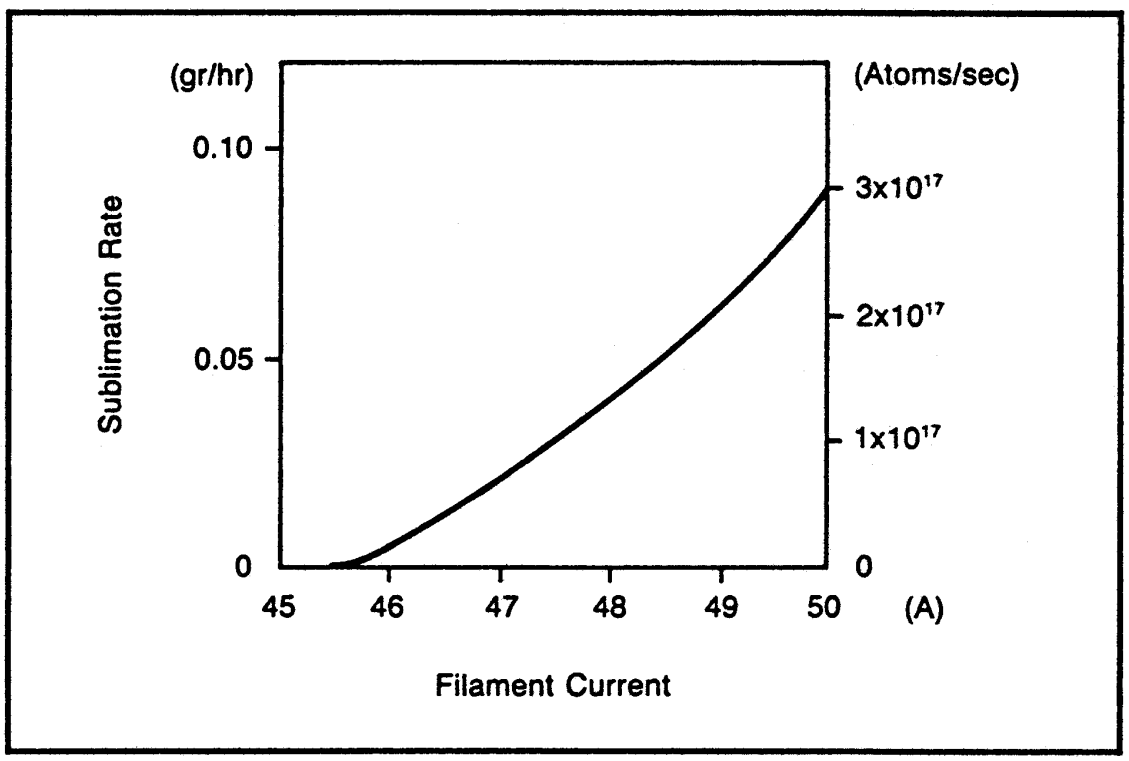

Figure 3 – Typical Titanium Sublimation Rate Versus Filament Current

MAINTENANCE

Filament Replacement

- Vent the system using dry nitrogen and maintain a slight positive pressure during the replacement procedure.
- Remove the filament cartridge from the system.
- Loosen the mounting screws, remove the expended filament, mount the new one and install the cartridge in the system.
- Degas the filament as in Operating Instructions.

Cleaning of Titanium Film

Titanium deposits build up on the surfaces of the vacuum chamber. These deposits will flake off, adding to the surface area to be pumped and cause the pumping performance to deteriorate. Therefore, a procedure should be developed to deposit the minimum amount of titanium required for a pumping job so that the interval between cleaning operations is as long as possible.

Cleaning Methods.

When cleaning is needed use one of these methods:

- Blast the internal surfaces of the pump chamber with glass beads or sand and then degrease it.

OR

- Remove loose deposits and then use the cleaning procedure for stainless steel as described in successive para.

⚠ WARNING!

Titanium flakes are flammable and may spontaneously ignite when exposed to air. A dull red, short-lived flame may result. Also, vigorous abrasion may produce sparks. Accumulated flakes may ignite at any time in the presence of air, either on or off the substrate. Do not clean up the flakes with a vacuum cleaner or leave the flakes in contact with any flammable materials; flakes should be stored in a metal container until they can be disposed of. For maximum safety during the transportation to a cleaning facility, heavily coated surfaces should be enclosed in an air-tight container.

Cleaning Procedure for Stainless Steel

⚠ WARNING!

The chemicals used in this procedure are corrosive. Only authorized trained personnel should make up the baths and process the parts. Check relevant local safety regulations.

Solvent degrease in trichloroethane or equivalent.
Hot alkali dip for about two minutes, depending on condition.
Rinse in hot tap water.
Hydrochloric acid dip. Solution: 1:1 HC1 (tech) in water at 70 °C.
Rinse in cold tap water.
Nitric-hydrofluoric acid dip: concentrated HNO_3, 97% by volume, concentrated HF 3% by volume.
Dip until surfaces gases slightly, then quickly rinse in water. Welds and knife-edge sealing surfaces will be attacked by the acid.
Excessive etching may cause pin-hole leaks in welds or marginal seals.
Rinse in cold tap water three times.
Rinse in cold deionized water (NaC1 less than 1 ppm) three times.
Methanol rinse (electronic grade).
Warm air dry in clean, filtered, fume-free air at about 65 °C.
(Optional) Air bake at 150 °C to 400 °C for 30 minutes to one hour, depending on the mass of the part.

DISPOSAL

Meaning of the "WEEE" logo found in labels
The following symbol is applied in accordance with the EC WEEE (Waste Electrical and Electronic Equipment) Directive.
This symbol (**valid only in countries of the European Community**) indicates that the product it applies to must NOT be disposed of together with ordinary domestic or industrial waste but must be sent to a differentiated waste collection system.
The end user is therefore invited to contact the supplier of the device, whether the Parent Company or a retailer, to initiate the collection and disposal process after checking the contractual terms and conditions of sale.

PARTS LIST

Replacement Part List

Description	Part Number
Clamping collar for filaments	00-618099-01
Clamping collar for ground rod	00-618205-00
Bushing for ground rod	00-618099-02
Ceramic filament spacer	00-618094-01
Wire link	00-618098-00
Clamp plate filament	00-618097-00
Screw, gold plates, 8-32 x ¼ lg	00-627347-04
Allen screw head 8-32 x 5/8 lg gold plated	00-618115-00
Hex nut gold plated 8-32	13-122008-00
Replacement filament package Consists of: 12 filaments 6 screws 8-32 x ¼ lg 3 screws 8-32 x 5/8 lg 3 nuts 8-32	916-0051

Accessories

Description	Part Number
ConFlat flange copper gasket (pkg of 10)	953-5014
European markets: Interconnection cable Mini Ti-Ball/TSP control unit (order cable separately)	 929-0730 929-0023 (220 V)
US markets: Interconnection cable Mini Ti-Ball/TSP control unit (order cable separately)	 924-0730 929-0022 (120 V)

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Request for Return

ISO 9001 REGISTERED

1. A Return Authorization Number (RA#) **WILL NOT** be issued until this Request for Return is completely filled out, signed and returned to Varian Customer Service.
2. Return shipments shall be made in compliance with local and international **Shipping Regulations** (IATA, DOT, UN).
3. The customer is expected to take the following actions to ensure the **Safety** of workers at Varian: (a) Drain any oils or other liquids, (b) Purge or flush all gasses, (c) Wipe off any excess residues in or on the equipment, (d) Package the equipment to prevent shipping damage, (for Advance Exchanges please use packing material from replacement unit).
4. Make sure the shipping documents clearly show the RA# and then return the package to the Varian location nearest you.

North and South America	**Europe and Middle East**	**Asia and ROW**
Varian Vacuum Technologies 121 Hartwell Ave Lexington, MA 02421 Phone : +1 781 8617200 Fax: +1 781 8609252	Varian SpA Via Flli Varian 54 10040 Leini (TO) – ITALY Phone: +39 011 9979111 Fax: +39 011 9979330	Varian Vacuum Technologies Local Office

CUSTOMER INFORMATION

Company name: ……

Contact person: Name: …… Tel: ……

Fax: …… E-Mail: ……

Ship Method: …… Shipping Collect #: …… P.O.#: ……

Europe only: VAT reg. Number: …… *USA only:* ☐ Taxable ☐ Non-taxable

Customer Ship To: …… Customer Bill To: ……

…… ……

…… ……

PRODUCT IDENTIFICATION

Product Description	Varian P/N	Varian S/N	Purchase Reference

TYPE OF RETURN *(check appropriate box)*

☐ Paid Exchange ☐ Paid Repair ☐ Warranty Exchange ☐ Warranty Repair ☐ Loaner Return
☐ Credit ☐ Shipping Error ☐ Evaluation Return ☐ Calibration ☐ Other ……

HEALTH and SAFETY CERTIFICATION

Varian Vacuum Technologies **CAN NOT ACCEPT** any equipment which contains **BIOLOGICAL HAZARDS** or **RADIOACTIVITY**. Call Varian Customer Service to discuss alternatives if this requirement presents a problem.

The equipment listed above (check one):

☐ **HAS NOT** been exposed to any toxic or hazardous materials

OR

☐ **HAS** been exposed to any toxic or hazardous materials. In case of this selection, check boxes for any materials that equipment was exposed to, check all categories that apply:

☐ Toxic ☐ Corrosive ☐ Reactive ☐ Flammable ☐ Explosive ☐ Biological ☐ Radioactive

List all toxic or hazardous materials. Include product name, chemical name and chemical symbol or formula.

……

Print Name: …… Customer Authorized Signature: ……

Print Title: …… Date: ……/……/……

NOTE: If a product is received at Varian which is contaminated with a toxic or hazardous material that was not disclosed, **the customer will be held responsible** for all costs incurred to ensure the safe handling of the product, and **is liable** for any harm or injury to Varian employees as well as to any third party occurring as a result of exposure to toxic or hazardous materials present in the product.

Do not write below this line

Notification (RA)#: …… Customer ID#: …… Equipment #: ……

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Request for Return

ISO 9001 REGISTERED

FAILURE REPORT

TURBO PUMPS and TURBOCONTROLLERS

☐ Does not start	☐ Noise	POSITION	PARAMETERS		
☐ Does not spin freely	☐ Vibrations	☐ Vertical	Power:		Rotational Speed:
☐ Does not reach full speed	☐ Leak	☐ Horizontal	Current:		Inlet Pressure:
☐ Mechanical Contact	☐ Overtemperature	☐ Upside-down	Temp 1:		Foreline Pressure:
☐ Cooling defective		☐ Other:	Temp 2:		Purge flow:
		……	OPERATION TIME:		

TURBOCONTROLLER ERROR MESSAGE:

ION PUMPS/CONTROLLERS

☐ Bad feedthrough	☐ Poor vacuum
☐ Vacuum leak	☐ High voltage problem
☐ Error code on display	☐ Other

Customer application:

VALVES/COMPONENTS

☐ Main seal leak	☐ Bellows leak
☐ Solenoid failure	☐ Damaged flange
☐ Damaged sealing area	☐ Other

Customer application:

LEAK DETECTORS

☐ Cannot calibrate	☐ No zero/high backround
☐ Vacuum system unstable	☐ Cannot reach test mode
☐ Failed to start	☐ Other

Customer application:

INSTRUMENTS

☐ Gauge tube not working	☐ Display problem
☐ Communication failure	☐ Degas not working
☐ Error code on display	☐ Other

Customer application:

PRIMARY PUMPS

☐ Pump doesn't start	☐ Noisy pump (describe)
☐ Doesn't reach vacuum	☐ Over temperature
☐ Pump seized	☐ Other

Customer application:

DIFFUSION PUMPS

☐ Heater failure	☐ Electrical problem
☐ Doesn't reach vacuum	☐ Cooling coil damage
☐ Vacuum leak	☐ Other

Customer application:

FAILURE DESCRIPTION

(Please describe in detail the nature of the malfunction to assist us in performing failure analysis):

NOTA: Su richiesta questo documento è disponibile anche in Tedesco, Italiano e Francese.
REMARQUE : Sur demande ce document est également disponible en allemand, italien et français.
HINWEIS: Auf Aufrage ist diese Unterlage auch auf Deutsch, Italienisch und Französisch erhältlich.

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Representative in most countries

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03/06